Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

764Ub

CAT/STA

United States
Department
of Agriculture

Forest Service

Intermountain
Research Station

Resource Bulletin
INT-78

November 1992

Logging Utilization—Montana, 1988

William H. McLain

USDA
NAT'L AGRIC. LIBRARY
RECEIVED
NOV 1[illegible] '92
ACQ./SERIALS BRANCH

THE AUTHOR

WILLIAM H. MCLAIN is a forester in the Interior West Resource Inventory, Monitoring, and Evaluation Program at the Intermountain Research Station. His primary area of responsibility is inventory and special projects. He holds a B.S. degree in forestry from Oklahoma State University, Stillwater, OK, and has done graduate work in economics at Weber State University, Ogden, UT. He began his Forest Service career in 1968 with the Intermountain Station.

RESEARCH SUMMARY

Data collected on 25 logging operations in Montana in 1988 provided board-foot/cubic-foot conversion factors of log scale and factors to apply to harvest volume estimates to obtain removals estimates. The components of timber products and removals, obtained by application of these factors to the 1988 Montana timber harvest, are included. Additional findings presented in table form are the diameter distribution of trees removed from growing stock per thousand cubic feet of products and the volume of logging residue in pieces 6 feet and longer as a proportion of product volume. Survey methods and estimates of data reliability are also presented.

Printed on recycled paper

Intermountain Research Station
324 25th Street
Ogden, UT 84401

Logging Utilization—Montana, 1988

William H. McLain

INTRODUCTION

A study relating Montana's timber harvest to the forest inventory was conducted concurrently with the statewide forest inventory in 1988-89.

Two other concurrent studies, timber product output (McLain and others in preparation) and fuelwood harvest (McLain 1990), provided estimates of log volumes harvested and delivered to primary wood processors and to residences burning firewood.

Logging utilization, the subject of this bulletin, provides the factors to convert reported harvest volumes received by primary wood processors into cubic feet and removals estimates.

Additional factors, also to be applied to harvest volumes, provide estimates of the diameter class distribution of the harvest and of the volume of residue in pieces 6 feet and longer.

STUDY METHODS

The study was conducted in Montana using the sampling and measurement techniques designed by A. K. Wilson of the Forest Survey Project at the Intermountain Station from 1959 to 60 (Wilson 1965).

Sample Size and Distribution

Measurements were obtained in the summer of 1988 on active sawlog and multiproduct logging operations located on timberland. These operations—the basic sample units—were distributed throughout the State. They were selected within four strata defined by land ownership and operator-size class. Two ownership classes were used—National Forest and other. Operator-size class corresponded to the production class of the wood processing plant receiving the harvested logs. Two size classes were used—small, those consuming less than 10 million board feet per year, and large, those consuming 10 million board feet and more per year.

Sample size was calculated to achieve a standard error of the logging residue ratio (total net cubic-foot volume of logging residue divided by the total net volume of timber products) of not more than plus or minus 20 percent.

The samples were distributed throughout the strata in proportion to the estimated harvest volume occurring in each stratum. Measurements from 20 logging operations were estimated to provide sufficient data to achieve a standard error of the ratio of less than 20 percent. Further, "large" mills were estimated to receive about 90 percent of the timber production, with 42 percent of the harvest estimated to occur on National Forests. In planning, 20 samples were distributed as close to these estimates as possible. However, field crews are sometimes forced to measure operations that are available, whether or not they fit the stratification scheme. In Montana, they measured 25 operations, rather than 20, to obtain minimum total log volume. The data were collected as follows: 80 percent of the operations sampled were sending the logs to large mills and 64 percent of the operations measured were on National Forest land (table 1).

Data Collection

The study design prescribed four basic measurements to be obtained from each sample unit to compute removals and logging residue factors.

On each sample unit, 12 to 21 felled and bucked product trees with an average sample unit total gross volume of about 2,900 board feet (International ¼-inch rule) and a varying number of associated nonproduct trees were measured to obtain:

1. Product volume
2. Noninventory volume in products
3. Volume of logging residue from product trees
4. Volume of logging residue from nonproduct trees

All measured trees were categorized as poletimber, sawtimber, salvable dead, cull, or nontimber. Gross and net volumes in cubic feet and board feet (International ¼-inch rule and Scribner rule) were obtained by scaling. These measurements were correlated to obtain factors to apply to reported product volumes received by primary wood processors. Thus, all factors were calculated as proportions of product volume. No product volume from cull trees or nontimber species was encountered on the logging operations sampled.

STUDY RESULTS

The results of this study compare cubic-foot/board-foot conversion factors, removals factors, removals

Table 1—Number of logging operations measured in each stratum, Montana, 1988

Stratum	Owner group: National Forest	Other	Total
	Number of operations measured		
Mill size:			
Small	5	0	5
Large	11	9	20
Total	16	9	25

volumes, logging residue volume in long pieces, and the diameter class distribution of trees harvested in 1988 on logging operations in Montana.

Log Scale Conversions

The following product volumes resulted from scaling the logs of the 386 product trees on the 25 logging operations measured.

	Product volume: Gross	Net
Cubic	12,018	11,873
Board feet, Scribner rule	63,790	62,650
Board feet, International ¼-inch rule	74,725	73,625

The conversions appearing in table 2 were calculated using the net product volumes. These conversions are statewide averages, reflecting the average conversion for the harvest of the product mix encountered on the 25 operations measured. Caution is recommended in applying these factors to State subdivisions or to harvests of a narrow range of products of small size, such as posts or fuelwood, or to sawlogs of exceptionally large diameters (see table 7).

Removals Factors, Montana, 1988

The factors in table 3 are applied to reported harvest volumes to estimate growing-stock and sawtimber removals from the inventory by logging. In this publication "removals" is limited to harvesting. The normal definition of removals includes other forms; the conversion of forest land to nonforest uses, for instance, would otherwise be considered a removal. Factors are used to estimate the amount of growing-stock or sawtimber volume in the products and the amount of logging residue associated with the product volume. Removals is the sum of these volumes (fig. 1).

Table 2—Net product volume conversion factors for Montana, 1988

1 cubic foot equals	5.2767	board feet (Scribner rule)
1 cubic foot equals	6.2010	board feet (International ¼-inch rule)
1 board foot equals (Scribner rule)	1.1752	board feet (International ¼-inch rule)

The growing-stock removals factor of 1.121 means that for every 100 cubic feet of logs from growing-stock trees harvested in Montana (table 3):

- 112.1 cubic feet were removed from the growing-stock inventory
  - 99.9 cubic feet of removals were in the logs
  - 12.2 cubic feet of removals were residue
    - 8.9 cubic feet of residue came from some of the trees producing the 100 cubic feet of logs
    - 3.3 cubic feet of residue were in trees knocked over while logging the 100 cubic feet

And 0.1 cubic foot of the 100 cubic feet was not growing-stock removals. It came from stumps and tops.

For every 100 cubic feet of logs from salvable dead trees harvested in Montana:

3.3 cubic feet of residue were produced in trees knocked over while logging

The sawtimber removals factor of 0.986 means that for every 100 board feet (Scribner) of logs from growing-stock trees harvested in Montana:

- 98.6 board feet were removed from the sawtimber inventory
  - 95.1 board feet of sawtimber removals were in the logs
  - 3.5 board feet of sawtimber removals were residue
    - 3.4 board feet of residue came from some of the trees producing the 95.1 board feet of removals in the logs
    - 0.1 board foot of residue was in trees knocked over while logging

And 4.9 of the 100 board feet were not sawtimber removals; this volume came from poletimber and the tops and stumps of sawtimber.

For every 100 board feet of logs from salvable dead trees harvested in Montana:

0.1 of a board foot of residue would have been produced in trees knocked over while logging

As in the case of log scale conversions, the reader is cautioned to consider the appropriate use of these factors. For instance, harvesting operations in a stand of predominantly dead timber may well produce no residue.

Table 3—Removals factors in cubic and board feet, Montana, 1988

Type of factor	Cubic feet	Board feet Scribner rule	Board feet International ¼-inch rule
Logging residue	0.122	0.035	0.034[1]
Product tree residue	.089	.034	.033
Nonproduct tree residue	.033	.001	.002
Noninventory product volume	.001	.049	.049
Inventory product volume	.999	.951	.951
Growing-stock (cubic) or sawtimber (board feet) removals	1.121	.986	.985

[1] Due to rounding: the logging residue factor does not equal the sum of the product tree residue factor and the nonproduct tree residue factor.

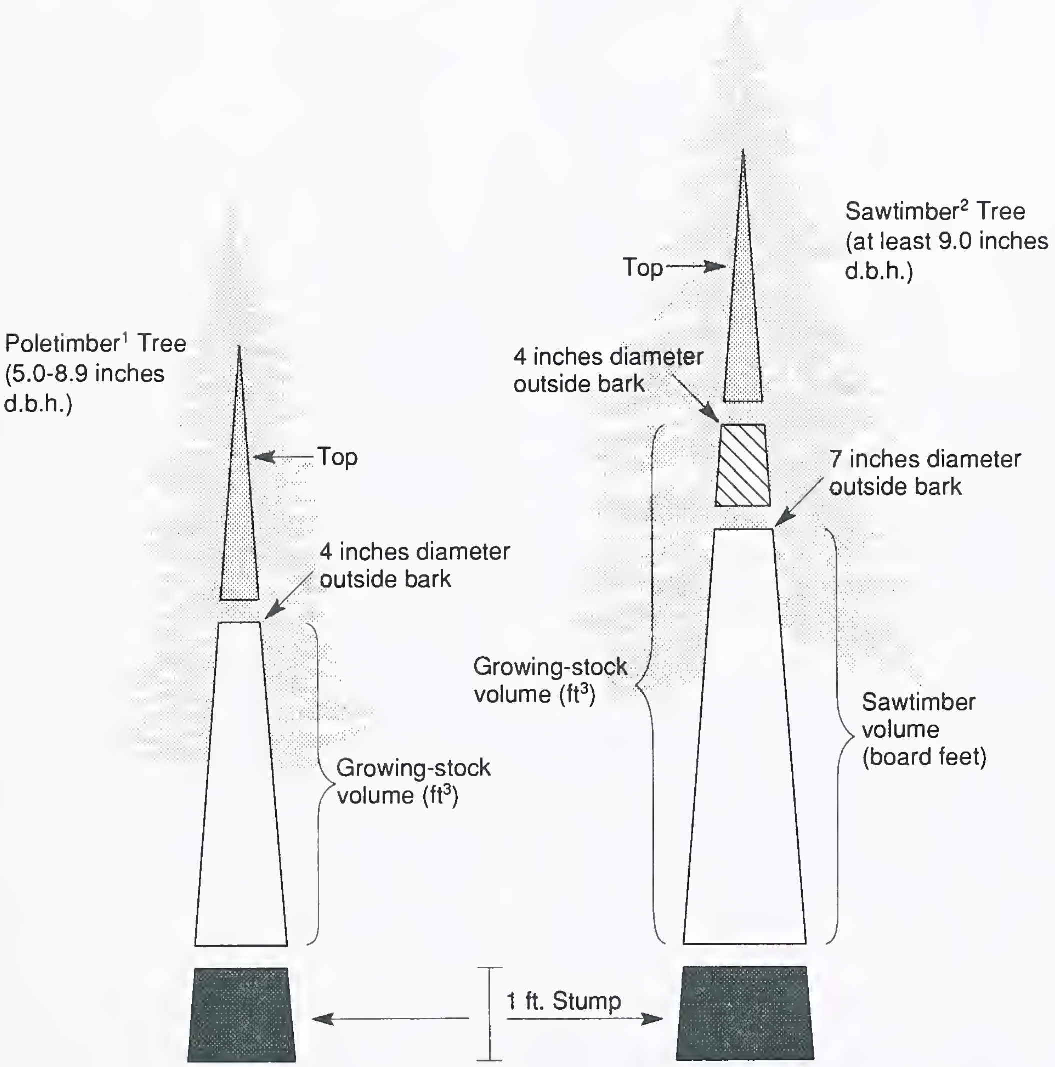
Poletimber[1] Tree (5.0-8.9 inches d.b.h.)
Top
4 inches diameter outside bark
Growing-stock volume (ft^3)
Sawtimber[2] Tree (at least 9.0 inches d.b.h.)
Top
4 inches diameter outside bark
7 inches diameter outside bark
Growing-stock volume (ft^3)
Sawtimber volume (board feet)
1 ft. Stump

Figure 1—Stem sections of a poletimber and a sawtimber tree. Inventory volume comprises growing-stock volume in poletimber trees and both growing-stock and sawtimber volume in sawtimber trees. Noninventory volume is shaded. Roundwood products from the noninventory portion of tree stems is noninventory product volume. Board-foot volume from poletimber trees or from sections of sawtimber trees above the 7-inch top (cross-hatched) is also noninventory product volume. [1] Softwoods; hardwoods, 5.0-10.9 inches d.b.h. [2] Softwoods; hardwoods, at least 11.0 inches d.b.h.

Removals and Products

Table 4 exhibits estimates of roundwood products harvested in Montana in 1988 and the associated removals volume.

Roundwood products came from growing-stock trees, salvable dead trees, and other sources (nontimber trees and nonforest land). The product volume from growing-stock trees comprises noninventory product volume and inventory product volume (growing-stock or sawtimber volume).

The growing-stock/sawtimber volume in products plus the logging residue equals the growing-stock/sawtimber removals.

Table 4—Timber and fuelwood production and timber removals by source of material and product, Montana, 1988

Products and additional removals	Product volume[1]				Noninventory product volume	Growing-stock removals
	Total	From growing-stock trees	From salvable dead trees	Other sources[2]		
	Thousand cubic feet					
Sawlogs[3]	189,510	175,481	14,029	—	175	175,306
Veneer logs[3]	38,903	38,671	232	—	39	38,632
Pulpwood[4]	2,059	2,059	—	—	2	2,057
House logs[3]	2,693	869	1,824	—	1	868
Other industrial[5]	3,990	3,728	262	—	4	3,724
Cedar products[3]	134	102	31	—	—	102
Total	237,289	220,910	16,378	—	221	220,689
Fuelwood[6]	21,875	1,548	20,006	[7]320	2	1,546
Logging residue[8]	—	—	—	—	—	27,491
Total	259,164	222,458	36,384	320	223	249,726
						Sawtimber removals
	Thousand board feet (Scribner rule)					
Sawlogs	1,000,052	926,019	74,033	—	45,375	880,644
Veneer logs	205,293	204,071	1,222	—	9,999	194,072
Pulpwood	10,866	10,866	—	—	532	10,334
House logs	14,210	4,585	9,625	—	225	4,360
Other industrial	1,459	1,459	—	—	71	1,388
Cedar products	705	539	166	—	26	513
Total	1,232,585	1,147,539	85,046	—	56,228	1,091,311
Fuelwood	113,741	8,169	105,572	—	400	7,769
Logging residue	—	—	—	—	—	40,249
Total	1,346,326	1,155,708	190,618	—	56,628	1,139,329
	Thousand board feet (International ¼-inch rule)					
Sawlogs	1,175,261	1,088,258	87,004	—	53,325	1,034,933
Veneer logs	241,260	239,824	1,436	—	11,751	228,073
Pulpwood	12,770	12,770	—	—	626	12,144
House logs	16,700	5,388	11,311	—	264	5,124
Other industrial	1,715	1,715	—	—	84	1,631
Cedar products	829	633	195	—	31	602
Total	1,448,534	1,348,588	99,946	—	66,081	1,282,507
Fuelwood	133,646	9,598	124,047	—	470	9,128
Logging residue	—	—	—	—	—	46,052
Total	1,582,180	1,358,186	223,993	—	66,551	1,337,687

[1] Sawlog, veneer log, pulpwood, house log, cedar product, and other industrial roundwood volumes (McLain and others in preparation). Fuelwood volume (McLain 1990).

[2] No board-foot volume in other sources.

[3] Volumes reported in thousand board feet (Scribner rule). Cubic-/board-foot conversions are from logging utilization study (table 2).

[4] Round pulpwood was reported in mixed units. These units were converted to cords. Cords were converted to thousand board feet (Scribner rule) using 3 cords/thousand board feet. Conversions from thousand board feet (Scribner rule) to thousand board feet (International ¼-inch rule) and thousand cubic feet used table 2.

[5] Utility poles, posts, and rails. Cubic- and board-foot (Scribner rule) volumes computed from actual dimensions. Board foot (International ¼-inch rule) volumes derived by converting Scribner volumes using table 2.

[6] Fuelwood volumes were reported in cords. Cords were converted to cubic feet at the rate of 80 cubic feet/cord (standard Forest Service conversion rate in Montana). Table 2 factors used to convert cubic volume to board-foot volume.

[7] Rocky Mountain maple, elm, and ash.

[8] Logging residue is associated with the harvest of industrial roundwood products. Logging residue associated with fuelwood harvest is assumed to be zero.

Table 5—Removal factors for Montana in 1965, compared to factors computed in 1988

Factor	1965[1]	1988	Difference
Growing-stock removals (cubic)	1.160	1.121	(−0.039)
Logging residue (cubic)	.163	.122	(−.041)
Sawtimber removals (board feet, International ¼-inch rule)	1.056	.985	(−.071)
Logging residue (board feet, International ¼-inch rule)	.074	.034	(−.040)

[1] Wilson and others 1970.

In table 4 industrial roundwood products are subtotaled exclusive of fuelwood to simplify comparisons and analysis.

The estimates of industrial roundwood products were furnished by the primary wood processors who received logs harvested in Montana in 1988; separate estimates were provided for products from growing-stock trees and salvable dead trees. The growing-stock/sawtimber removals component of the products, the noninventory product volume component, and the logging residue volume were estimated by applying factors from table 3 to the reported harvest volumes.

The fuelwood estimates, obtained by sampling and canvassing commercial fuelwood harvesters, were also obtained separated by growing stock and dead; a small volume fell into an additional category, other sources, which means nontimber species. Because the logging utilization data were not collected from fuelwood harvesting operations, some adjustments were made to estimate growing-stock/sawtimber removals associated with fuelwood. The appropriate table 3 factors were used to estimate the growing-stock/sawtimber product volume, but residue was estimated to be zero. We assumed that all growing-stock/sawtimber volume in trees cut for fuelwood and trees killed by such logging went into the product. The fuelwood product volume from growing-stock trees was very small, less than 1 percent of the growing-stock removals generated by the industrial roundwood harvest. Consequently, the propriety of applying (or not applying) factors developed from industrial roundwood operations to fuelwood harvest volumes is hardly worrisome.

Removals Factors, Then and Now

Table 5 compares the Montana removals factors from data collected in 1965 (Wilson and others 1970) to those from 1988. Current timber harvesting removes 4 percent less growing stock and produces 4 percent less logging residue from growing stock for the same product volume than in 1965.

Sawtimber volume in logging residue has changed similarly. The 7 percent decrease in sawtimber removals associated with a given board-foot volume of logs results in large measure from an increase in the harvest of poletimber.

Logging Residue Volume in Pieces 6 Feet and Longer

Table 6 shows the factor to estimate the cubic volume of logging residue from product trees in pieces 6 feet in length and longer to a 4-inch top; the proportion of product trees producing such residue; and the volume of residue at least 6 feet long produced in Montana in 1988. The factor, 0.068, means that residue volume in pieces 6 feet long and longer equals 6.8 percent of the product volume from growing-stock trees. Nonproduct tree residue may account for additional residue volume in pieces 6 feet and longer.

The proportion of trees measured that produced residue in pieces 6 feet and longer may indicate the degree of utilization. The lower the proportion, the higher the utilization.

Diameter Class Distribution of Trees Harvested or Damaged

Table 7 gives information about the number of growing-stock trees and the growing-stock volume harvested or destroyed in each diameter class. Such information can be used when computing diameter class cutting rates to project residual inventory, growth, and yield.

Information from the 1965 utilization study is provided for comparison.

Table 6—Volume, proportion of harvest volume (factor), and proportion of product trees containing logging residue to a 4-inch top in pieces 6 feet and longer, Montana, 1988

Residue volume in pieces 6 feet and longer (thousand cubic feet)	Factor[1] for residue volume in pieces 6 feet and longer	Proportion of product trees producing residue volume in pieces 6 feet and longer
15,022	0.068	0.886

[1] Apply to product volume.

Table 7—Diameter at breast height (d.b.h.) class distribution of the number and volume of growing-stock trees removed from inventory through harvesting per thousand cubic feet of net product volume, Montana, 1988—with the number of trees removed in 1965 provided for comparison. The 1965 volume by d.b.h. class is unavailable

D.b.h. class	Number of growing-stock trees 1965[1]	Number of growing-stock trees 1988	Volume of growing-stock trees in cubic feet 1988
2	8.93	11.54	—
4	6.13	6.48	0.08
6	3.03	6.15	18.41
8	2.92	8.08	69.90
10	4.70	8.42	130.12
12	4.34	5.81	126.13
14	4.16	3.37	114.17
16	2.68	1.94	76.26
18	2.26	2.61	144.37
20	1.19	1.85	130.88
22	.60	1.18	107.22
24	.24	.51	49.79
26	.30	.42	55.56
28	.12	.17	26.55
30+	1.43	.34	72.52
All classes[2]	43.02	58.87	1,121.98

[1] Wilson and others 1970.

[2] Data may not sum to totals due to truncating or rounding.

RELIABILITY OF ESTIMATES

The computation of the standard error of the various residue and utilization percentages employs the formula for the standard error of a ratio (Cochran 1963, p. 158), which may be stated:

$$S_R = \sqrt{\frac{\bar{R}^2}{n}\left[\frac{\sum_{i=1}^{n}(y_i-\bar{y})^2}{(n-1)\bar{y}^2} + \frac{\sum_{i=1}^{n}(x_i-\bar{x})^2}{(n-1)\bar{x}^2} - \frac{2\sum_{i=1}^{n}(x_i-\bar{x})(y_i-\bar{y})}{(n-1)\bar{y}\bar{x}}\right]}$$

where

y = logging residues measured on an operation (net volume)

x = timber products measured on an operation (net volume)

$$\bar{R} = \frac{\sum_{i=1}^{n} y_i / n}{\sum_{i=1}^{n} x_i} = \text{logging residues ratio}$$

n = total number of operations sampled

$$\bar{y} = \frac{\sum_{i=1}^{n} y_i}{n}$$

$$\bar{x} = \frac{\sum_{i=1}^{n} x_i}{n}$$

$SE(\%) = \frac{S_R}{\bar{R}} \times 100$ = standard error of the ratio as a percentage of the ratio

Table 8 gives the achieved standard errors of the logging residue volume/product volume ratios and the standard errors as percentages of the ratios.

Table 8—Achieved standard errors of the logging residue volume/product volume ratios and the standard errors as percentages of the ratios

	Standard error of the ratio (SR)	Standard error of the ratio as a percentage of the ratio (SE[%])
Cubic foot	0.0127	10.36
Board foot, Scribner rule	.0061	17.38
Board foot, International 1/4-inch rule	.0058	16.84

REFERENCES

Cochran, William G. 1963. Sampling techniques. 2d ed. New York: John Wiley and Sons, Inc. 413 p.

McLain, William H. 1990. Montana's 1988 fuelwood harvest. Resour. Bull. INT-70. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station. 8 p.

McLain, William H.; Keegan, Charles E., III; Wichman, Daniel P. [In preparation]. Montana's timber production and mill residue, 1988. Resour. Bull. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station.

Wilson, Alvin K.; Green, Robert E.; Choate, Grover A. 1970. Logging residues on sawlog operations, Idaho and Montana. Res. Pap. INT-77. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station. 12 p.

Wilson, Alvin K. 1965. Work plan for logging residues studies in the Rocky Mountain States. On file at: U.S. Department of Agriculture, Forest Service, Intermountain Research Station, Forest Survey Research Work Unit, Ogden, UT. 40 p.

APPENDIX I: REMOVALS FACTORS FORMULAS

The factors in table 3, derived from data collected on 25 logging operations, were calculated as follows:

Growing-Stock Factor (cubic)

$$\text{Logging residue} = \text{Product tree residue factor} + \text{Nonproduct tree residue factor}$$

$$\text{Product tree residue} = \frac{\text{Product tree residue from growing-stock trees}}{\text{Product volume from growing-stock trees}}$$

$$\text{Nonproduct tree residue} = \frac{\text{Nonproduct tree residue from growing-stock trees}}{\text{Product volume from growing-stock trees and salvable dead trees}}$$

$$\text{Noninventory product volume} = \frac{\text{Noninventory product volume from growing-stock trees}}{\text{Product volume from growing-stock trees}}$$

$$\text{Inventory product volume} = \frac{\text{Growing-stock product volume}}{\text{Product volume from growing-stock trees}}$$

or

$$\text{Inventory product volume} = 1 - \text{Noninventory product volume factor}$$

$$\text{Growing-stock removals} = \text{Inventory product volume factor} + \text{Logging residue factor}$$

Sawtimber Removals Factor (board feet)

$$\text{Logging residue} = \text{Product tree residue factor} + \text{Nonproduct tree residue factor}$$

$$\text{Product tree residue} = \frac{\text{Product tree residue from sawtimber trees}}{\text{Product volume from growing-stock trees}}$$

$$\text{Nonproduct tree residue} = \frac{\text{Nonproduct tree residue from sawtimber trees}}{\text{Product volume from growing-stock and salvable dead trees}}$$

$$\text{Noninventory product volume} = \frac{\text{Noninventory product volume from sawtimber trees} + \text{product volume from poletimber trees}}{\text{Product volume from growing-stock trees}}$$

$$\text{Inventory product volume} = \frac{\text{Sawtimber product volume}}{\text{Product volume from growing-stock trees}}$$

or

$$\text{Inventory product volume} = 1 - \text{Noninventory product volume factor}$$

$$\text{Sawtimber removals} = \text{Inventory product volume factor} + \text{Logging residue factor}$$

APPENDIX II: TERMINOLOGY

Cubic-foot / board-foot conversions—The cubic-foot volume in product logs compared to the board-foot volume in the same logs for selected log scales.

Cull trees—Live timber species trees less than one-third sound.

Forest lands—Lands at least 10 percent stocked by forest trees of any size, including lands that formerly had such tree cover and that will be naturally or artificially regenerated. The minimum area for classification of forest land is 1 acre. Roadside, streamside, and shelterbelt strips of timber must have a crown width at least 120 feet wide to qualify as forest land. Unimproved roads and trails, streams, and clearings in forest areas are classified as forest if less than 120 feet wide.

Forest trees—Woody plants having a well-developed stem or stems, usually more than 12 feet in height at maturity, with a generally well-defined crown.

Growing-stock product volume—The growing-stock volume in timber products such as sawlogs, posts, poles, pulpwood, fuelwood, and house logs.

Growing-stock removals (in this publication)—The growing-stock volume removed from inventory by harvesting. Consists of logging residue and the growing-stock volume of products.

Growing-stock trees (in this publication)—Live sawtimber trees and poletimber trees meeting specified standards of quality and vigor; excludes cull trees.

Growing-stock volume—Net cubic-foot volume in live poletimber-size and sawtimber-size growing-stock trees from a 1-foot stump to a minimum 4-inch top outside bark.

Industrial wood products—All timber products except fuelwood.

Inventory product volume—The growing-stock or sawtimber volume in timber products.

Logging residue—The unused growing-stock or sawtimber volume of trees cut or killed by logging and left in the woods.

Noninventory product volume—The cubic volume of timber products that came from the upper stems (beyond the 4-inch top diameter outside bark [d.o.b.]) or below the 1-foot high stumps of growing-stock product trees; the board-foot volume in timber products that came from poletimber trees and from the upper stems (beyond the 7-inch or 9-inch top d.o.b.) and below the 1-foot high stump of sawtimber trees; the product volume from cull trees.

Non-National Forest lands—Lands not administered by the Forest Service, U.S. Department of Agriculture.

Nonproduct tree residue—The growing-stock or sawtimber volume of nonproduct trees cut, killed, or damaged while felling or skidding product trees. This volume is left in the woods. It is a component of slash.

Nonproduct trees—Those trees cut, killed, knocked down, or destroyed due to felling and skidding the product trees.

Nontimber trees—Trees other than timber species.

1022328066

Other sources—Product volume from nontimber species (such as juniper and, in the West, oak) and trees harvested on nonforest land (such as urban streets, orchards, and windbreaks).

Poletimber tree—A live tree of timber species, at least 5 inches diameter at breast height (d.b.h.) but smaller than sawtimber size, containing at least one 8-foot bolt, and more than one-third sound.

Primary wood processors—Mills, plants, and yards receiving logs for processing into products such as studs, boards, lumber, fiberboard, plywood, utility and building poles, house logs, excelsior, pulp and paper, pulp chips, mine timbers, railroad ties, pilings, hop stakes, grape stakes, barrel staves, siding, paneling, and shakes. Primary wood processors include sawmills, fiberboard mills, plywood plants, house log plants, post and pole yards, post and pole treating plants, excelsior manufacturing plants, and pulp and paper mills.

Product tree residue—The unused growing-stock or sawtimber volume of product trees that is left in the woods.

Product trees—Trees felled for products such as sawlogs, posts, poles, pulpwood, fuelwood, or house logs.

Product volume—The cubic-foot or board-foot volume in timber products such as sawlogs, posts, poles, pulpwood, fuelwood, and house logs. Product volume comprises volume from salvable dead trees, other sources, and the noninventory and growing-stock (or sawtimber) volume from growing-stock trees.

Removals (in this publication)—The growing-stock and sawtimber volume removed from the inventory by harvesting. Consists of logging residue and the growing-stock and sawtimber volume of products.

Residual inventory (in this publication)—The growing-stock and sawtimber volume remaining after the inventory is reduced through removals due to harvest.

Salvable dead trees—Standing or down dead trees of timber species that are merchantable by regional standards.

Salvable dead volume—The cubic volume in dead poletimber-size and sawtimber-size trees of timber species from a 1-foot stump to a minimum 4-inch top d.o.b. The board-foot volume in dead sawtimber-size trees of timber species between a 1-foot-high stump and a 7-inch d.o.b. top (softwoods) or 9-inch d.o.b. top (hardwoods).

Sawlog portion—That part of the bole of sawtimber trees between a 1-foot stump and the sawlog top.

Sawlog top—The portion on the bole of sawtimber trees above which a sawlog cannot be produced. The minimum sawlog top is 7 inches d.o.b. for softwoods and 9 inches d.o.b. for hardwoods.

Sawtimber product volume—The sawtimber volume in timber products.

Sawtimber removals (in this publication)—The sawtimber volume removed from inventory by harvesting. Consists of logging residue and the sawtimber volume of products.

Sawtimber trees—Live trees of timber species meeting regional size and defect specifications. A softwood tree must be at least 9 inches d.b.h. and a hardwood tree 11 inches d.b.h. The tree must be more than one-third sound.

Sawtimber volume—Net volume in board feet of the sawlog portion of live sawtimber trees.

Slash—The wood volume of cut or killed trees resulting from logging and left in the woods (not hauled out as timber products). Slash consists of logging residue (growing-stock and sawtimber volume) and noninventory volume (such as tree tops, limbs, cull trees, dead trees, and nontimber trees).

Timberland—Forest land where timber species make up at least 10 percent stocking.

Timber products—Roundwood products such as sawlogs, posts, poles, pulpwood, veneer logs, and house logs.

Timber removals—Same as "Removals."

Timber species—Trees traditionally used for industrial wood products. In the Rocky Mountains, these include only three hardwoods: birch, aspen, and cottonwood; and all softwood species except pinyon and juniper.

Total removals (associated with harvesting)—Comprises the growing-stock (or sawtimber) volume contained in products, the product tree logging residue, and the nonproduct tree logging residue.

☆U.S. GOVERNMENT PRINTING OFFICE: 1992-774-049/66017

* NATIONAL AGRICULTURAL LIBRARY
1022328066

McLain, William H. 1992. Logging utilization—Montana, 1988. Resour. Bull. INT-78. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station. 9 p.

Reports results of a study of timber harvesting operations in Montana to derive factors used to estimate logging residue, growing-stock and sawtimber removals, diameter class distributions of harvests, and board-foot/cubic-foot conversions.

KEYWORDS: timber removals, growing-stock removals, sawtimber removals, cubic-foot/board-foot conversions, logging residues

INTERMOUNTAIN RESEARCH STATION

The Intermountain Research Station provides scientific knowledge and technology to improve management, protection, and use of the forests and rangelands of the Intermountain West. Research is designed to meet the needs of National Forest managers, Federal and State agencies, industry, academic institutions, public and private organizations, and individuals. Results of research are made available through publications, symposia, workshops, training sessions, and personal contacts.

The Intermountain Research Station territory includes Montana, Idaho, Utah, Nevada, and western Wyoming. Eighty-five percent of the lands in the Station area, about 231 million acres, are classified as forest or rangeland. They include grasslands, deserts, shrublands, alpine areas, and forests. They provide fiber for forest industries, minerals and fossil fuels for energy and industrial development, water for domestic and industrial consumption, forage for livestock and wildlife, and recreation opportunities for millions of visitors.

Several Station units conduct research in additional western States, or have missions that are national or international in scope.

USDA policy prohibits discrimination because of race, color, national origin, sex, age, religion, or handicapping condition. Any person who believes he or she has been discriminated against in any USDA-related activity should immediately contact the Secretary of Agriculture, Washington, DC 20250.